ATTACHMENT 3-5

BUDGETARY QUOTATIONS FROM EQUIPMENT MANUFACTURERS



COVER SHEET

ENGELHARD

161 WOOD AVENUE ISELIN, NJ 86236 732-206-8080

POWER GENERATION SALES: ENGELHARD CORPORATION 2205 CHEQUERS COURT BEL AIR, MD 21016 PHONE 418-588-4297 FAX 418-868-1841 E-Mail Fred_Book@ENGELHARD.COM

DATE:

April 25, 1999

NO. PAGES

4

(INCLUDING COVER)

TO:

RAYTHEON

ENGELHARD

FAX 605-720-2384

(80)

ATTN: Nancy Ellison

ATTN: Mike Radovich

FROM:

Fred Booth

Ph 410-569-0297 // FAX 410-568-1841

CONFIDENTIALITY NOTICE

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RE:

Allegheny Power

Simple Cycle Project

Comet® CO and NOxCAT™ ZNX™ SCR Catalyst Systems

Engelhard Budgetary Proposal EPB99395

Dear Mr. Radovich.

We provide Engelhard Budgetary Proposal EPB99395 for Engelhard Comet® CO and NOxCAT™ ZNX™ High Temperature SCR Catalyst systems. This is per our phone conversation and your FAXed request of April23, 1999.

Our Proposal is based on:

- CO Catalyst for 80% CO reduction:
- 6CR Catalyst for 65% NOx reduction with ammonia slip of 10 ppmvd @ 15% O₂;
- · Scope as noted:
- 4"WG Pressure Drop across cetalysts;

We request the opportunity to work with you on this project.

Quil ORutt

Sincerely yours,

ENGELHARD CORPORATION

Frederick A. Booth Senior Sales Engineer

Nancy Ellison - Proposal Administrator

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Raytheon - Allegheny Power Simple Cycle Cycle Project CO and SCR Catalyst Systems Engelhard Budgetary Proposal EP899396 April 26, 1989

ENGELHARD CORPORATION CAMET CO CATALYST SYSTEM NOXCAT™ ZNX™ 8CR NOX ABATEMENT CATALYST SYSTEM

Engelhard Corporation ("Engelhard") offers to supply to Buyer the Carnet® metal substrate CO System and NOxCAT™ zNX^{ms} ceramic substrate SCR systems summerized per the technical data and site conditions provided.

Scope of Supply

Engelhard Carnet® CO catalyst in modules with internal support frame;

Engelhard NOxCAT™ ZNX™ SCR catalyst in modules with internal support frame;

Duct Section - Internally insulated - to house CO Catalyst, AIG, and SCR Catalysts;

4. Ammonia Delivery System Components - 28% aqueous ammonia to skid

BUDGET PRICES:

Per Turbine

CO System

SCR System

Replacement CO Catalyst

\$358,000 \$250,000

Replacement SCR Catalyst

\$1,030,000 \$ 600,000

WARRANTY AND GUARANTEE:

Mechanical Warranty:

One year of operation" or 1.5 years after catalyst delivery, whichever occurs

FirSL.

Performance Guarantee:

Three (3) years of operation" or 3.5 years after catalyst delivery, whichever

occurs first. Catalyst warranty is prorated over the guaranteed life.

Expected Life 5 - 7 years

SCR SYSTEM DESIGN BASIS:

Gas Flow from:

Ges Flow:

Fuel:

Gas Flow Rate (At catalyst face):

LM6000 Combustion Turbine Hortzontal

Natural Gas & Oil

See Performance data - Designed for Gas Velocities within ±15% at the reactor

iniet

Temperature (At catalyst face):

CO iniet (At catalyst face):

Designed for Gas Temperatures must be within ±20°F at the reactor inlet

CO Reduction

See Performance Data 20%

NOx inlet (At catalyst face):

25 ppmvd @ 15% O₂

NOx Reduction '

65%

NH Slip:

10 ppmvd @ 15%O2

Pressure Drop:

4"WG - Nom.

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Raytheon — Alleghany Power Simple Cycle Cycle Project CO and SCR Catalyst Systems Engelhard Budgetary Proposal EP893396 April 26, 1999

Performance Date

Performance Data	17.00		
	GIVEN / CALCULATED DATA		
	FUEL		
	TURBINE FXHALIST ELONAL IN AL	NG	
TURBINE E	EXHAUST GAS ANALYSIS, % WT. NZ	973,080	975,24
		72.31	71.8
	02	16.33	15.2
		4.89	5.4
	H20	6.24	5.1
	A	1.23	1.2
TURBINE EX	CHAUST GAS ANALYSIS, % VOL NO	72.74	
	02	13.50	73.2
	COS	3.13	13,6
	H20	9.76	4,1
	A	0.87	8.12
		V.87	0.84
GIV	EN: TURBINE CO, ppmvd@ 15%02	36	63
	CALC .: TURBINE CO, LIMIT	31.8	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
ON CO		· · · · · · ·	57.3
GIVE	N: TURBINE NOX, ppmvd @ 15%02	25	42
	CALC .: TURBINE NOX, IDAY	36.1	62.7
)	CALC CACNEL		Total Control
<i></i>	CALC. GAS MOL WT.	28.18	28.52
FLUE GAS TEMP. @	CO and SCR CATALYST, F (+/-20)	816	1000000
	DESIGN REQUIREMENTS	810	829
<u>CO CA</u>	JALYST CO OUT, ppmvd@15%02	7 <u>=</u> 7	
2		7.2	12.6
SCR CAT	ALYST NOX OUT, ppmvd@15%02	8.75	112321 <u>0</u> 0
	NH3 SLIP, ppmvd@15%02	10	14.7
		10	10
CO and S	CR PRESSURE DROP, "WG - Max.	Nom. 4	Norn. 4
	ARANTEED DEDECORMANCE TATE		
GU	THE DESTRUCTION OF DATA		77011. 4
GU	ARANTEED PERFORMANCE DATA LYSI CO CONVERSION, % - Min.	80.0%	
GU	LYST CO CONVERSION, % - Min. CO OUT, Ruthr - Max.	80.0%	80.0%
CO CATA	CO OUT, Briter - Max. CO OUT, Briter - Max. CO OUT, pprivate 15%02 - Max	6.3	80.0% 11.5
CO CATA	CO OUT, Pormyde 15%02 - Max.	8.3 7.2	80.0% 11.5 12.6
© CATA	CO OUT, PARTY DESCRIPTION, % - MEX. CO OUT, PARTY DESCRIPTION, % - MEX. CO OUT, PARTY DESCRIPTION, % - MEX. CO SOS CONVERSION, % - MEX.	8.3 7.2 38%	80.0% 11.5 12.6 38%
SU CO CATAI S S VOC - NON-METHANE / NON-ETH	CO OUT, PATH - MEN. VOC ONVERSION, % - MIN. FANE - 50% SATURATED	8.3 7.2	80.0% 11.5 12.6
SU CO CATAI S S VOC - NON-METHANE / NON-ETH	CO OUT, PARTY DESCRIPTION, % - MEX. CO OUT, PARTY DESCRIPTION, % - MEX. CO OUT, PARTY DESCRIPTION, % - MEX. CO SOS CONVERSION, % - MEX.	8.3 7.2 38%	80.0% 11.5 12.8 38%
SU CO CATAL SO CATAL SO CO - NON-METHANE / NON-ETH	CO OUT, B/hr - Max. CO OUT, B/hr - Max. CO OUT, PPRIVAGE 15%02 - Max. CO OUT, PPRIVAGE 15%02 - Max. VOC= CONVERSION, % - Min. VOC= CONVERSION, % - Min. 4ANE - 50% SATURATED CO PRESSURE DROP, "WG - Max.	8.3 7.2 38% 40%	80.0% 11.5 12.8 38% 40%
SU CO CATAL SO CATAL SO CO - NON-METHANE / NON-ETH	CO OUT, POINT - MAX. VOC - CONVERSION, % - MAX. VOC - CONVERSION, % - MIN. LANE - 50% SATURATED CO PRESSURE DROP, "WG - MAX. YST NOX CONVERSION, % - MIN.	8.3 7.2 38% 40%	80.0% 11.5 12.8 38% 40%
SU CO CATAL SO CATAL SO CO - NON-METHANE / NON-ETH	CO OUT, PAIN - MEN. CO OUT, PAIN - MEX. VOC - CONVERSION, % - MEX. VOC - CONVERSION, % - MIN SO% SATURATED CO PRESSURE DROP, "WG - MEX. YST NOX CONVERSION, % - MIN. NOX OUT, BAN - MEN.	8.3 7.2 38% 40% 65.0% 12.6	80.0% 11.5 12.8 38% 40% 0.8 65.0% 21.9
SU CO CATAL SO CATAL SO CO - NON-METHANE / NON-ETH	CO OUT, POINT - MAX. VOC - CONVERSION, % - MAX. VOC - CONVERSION, % - MIN. LANE - 50% SATURATED CO PRESSURE DROP, "WG - MAX. YST NOX CONVERSION, % - MIN.	8.3 7.2 38% 40%	80.0% 11.5 12.8 38% 40% 0.8
SCR CATAL	CO OUT, BUTH - MEX. CO OUT, BUTH - MEX. CO OUT, PPITTIVE 15%02 - MEX. CO OUT, PPITTIVE 15%02 - MEX. VOCO CONVERSION, % - MID. VOCO CONVERSION, % - MID. VOCO PRESSURE DROP, "WG - MEX. YST NOX CONVERSION, % - MER. NOX OUT, BUTH - MEX. NOX OUT, PPITTIVE 15%02 - MEX. COUS NIHS (28% SOL.) FLOW, BUTH	8.3 7.2 38% 40% 65.0% 12.6 8.76	80.0% 11.5 12.8 38% 40% 0.8 85.0% 21.9 14.7
SCR CATAL	CO OUT, BUTH - MEX. CO OUT, BUTH - MEX. CO OUT, PPITTIVE 15%02 - MEX. CO OUT, PPITTIVE 15%02 - MEX. VOCO CONVERSION, % - MID. VOCO CONVERSION, % - MID. VOCO PRESSURE DROP, "WG - MEX. YST NOX CONVERSION, % - MER. NOX OUT, BUTH - MEX. NOX OUT, PPITTIVE 15%02 - MEX. COUS NIHS (28% SOL.) FLOW, BUTH	8.3 7.2 38% 40% 40% 65.0% 12.6 6.76	80.0% 11.5 12.8 38% 40% 0.8 65.0% 21.9 14.7
SCR CATAL SCR CATAL SCR CATAL	CO OUT, RUTH - MEX. CO OUT, RUTH - MEX. CO OUT, PRITIVE 15%02 - MEX. CO OUT, PRITIVE 15%02 - MEX. VOC** CONVERSION, % - MIR. FANE - 50% SATURATED CO PRESSURE DROP, "WG - MEX. YST NOX CONVERSION, % - MIR. NOX OUT, BUTH - MEX. NOX OUT, PRITIVE 15%02 - MEX.	8.3 7.2 38% 40% 65.0% 12.6 8.76	80.0% 11.5 12.8 38% 40% 0.8 85.0% 21.9 14.7

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Raytheon - Allegheny Power Simple Cycle Cycle Project CO and SCR Catalyst Systems Engelhard Budgetary Proposal EP899396 April 28, 1999

Scope of Supply: The equipment supplied is installed by others in accordance with Engelhard design and installation

Engelhard Carnet® CO and NOXCAT™ VNX™ SCR catalyst in modules;

Internal support frames for catalyst modules - installed inside HRSG internally insulated casing;

Duci Section with internal insulation to house CO, AIG, and SCR;

Ammonia Delivery System Components: Aqueous (28% Sol.) Ammonia to skid

Ammonia Injection Grid (AIG);

AIG manifold with flow control valves;

NH-J/Air dilution skid: Pre-piped & wired (including all valves and fittings)

Two (2) dilution air fans, one for back-up purposes

Panel mounted system controls for:

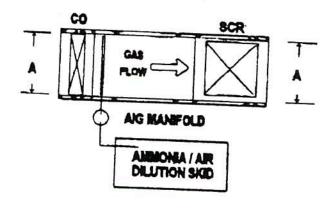
Blowers (on/off/flow indicators)

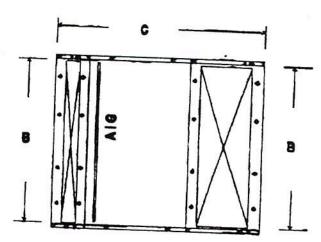
Air/ammonis flow indicator and controller

System pressure indicators Main power disconnect switch

Assumed Dimensions:

Inside Liner Width (A) 27'-0" inside Liner Height (B) 19'-9" Reactor Depth - CO and SCR (C) 15'4"





Excluded from Scope of Supply: Ammonia storage and pumping

Any transitions to and from reactor Any interconnecting field piping or wiring

Flectrical grounding equipment

ities

oundations

All Monitors

All other items not specifically listed in Scope of Supply